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A PROPOSED DIP PROTRACTOR

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The device herein described consists of a celluloid chart giving the dip of any plane along a line at any given angle with the strike. Several tables for this purpose have appeared which, for office work, are entirely satisfactory. The protractor has in a certain class of

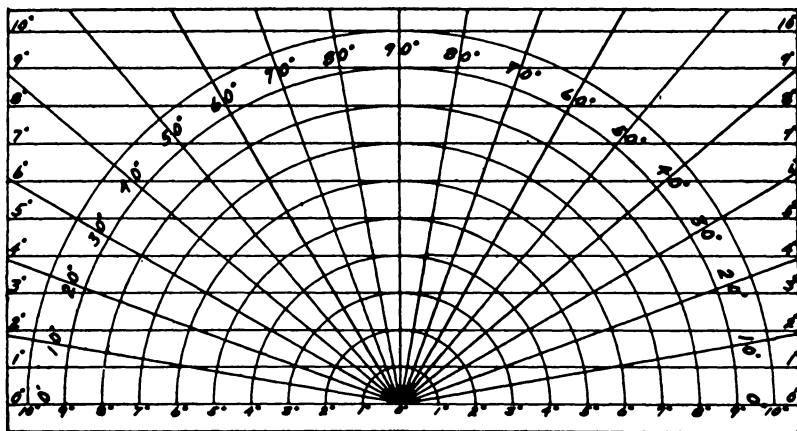


FIG 1.

fieldwork, which will be outlined below, a superiority over the tables and has not, so far as I am aware, been before described.

The protractor consists of a rectangular plate of transparent celluloid ruled and numbered as shown in Fig. 1. The circular curves represent each a given angle of dip of the plane, i.e., the maximum angle commonly denoted dip. The intersection of the appropriate curve with the radiating line of direction of the required dip cuts off an ordinate, or distance from the horizontal

diameter line, the value of which in terms of the vertical scale at the side is the required angle of dip.

As an example, let it be required to find the angle of dip in a direction 40° from the strike, of a plane of which the maximum dip is 5° . Following the 5° curve to its intersection with the 40° radial line and interpolating this point between the 3° and 4° parallel lines we find the value of approximately $3^\circ 15'$ which is the desired angle of dip.

The particular field of usefulness of this device is in projecting the plane of a given stratum whose dip and strike are known from a plane table set up on the outcrop. We have in this case the dip and strike of the plane and the direction of the line of sight for which we wish the dip. The horizontal diameter line of the protractor is laid parallel to the strike as recorded on the oriented plane-table sheet and the alidade set on the required line of sight with its edge passing through the center on the protractor. At the intersection of the ruler edge with the appropriate dip-curve is read the required angle of elevation or depression to be set on the telescope to project the plane. This graphic solution of the problem in the field and directly on the plane table is much more rapid than a combined protractor and dip-table solution and is sufficiently accurate for reconnaissance and mapping purposes where projecting the outcrop on topography is the "best guess" the field man has in many instances.

The protractor as shown is made only for angles up to 10° because occasions for projecting dip in cases of higher dips are much more rare and correspondingly less accurate, and greater accuracy for the low angles is attained by putting fewer lines on the celluloid. The radii of the several dip circles are constructed proportional to the tangents of the respective dip angles, as is also the spacing of the parallel horizontal lines which are tangent to them. Thus if A is the nominal dip of any plane, B the required oblique dip, and C the angle of obliquity, we have

$$\sin C = \frac{\tan B}{\tan A}$$

and a circular arc may be used for the dip-curve. For the low angles as shown on the protractor in Fig. 1 the tangents are so nearly proportional to the angles that the spacing intervals depart from equality by an inappreciable amount only. There should be no difficulty in reading required dip angles to the nearest two or three minutes of arc with the protractor as shown, and several protractors might provide for the whole range up to ninety degrees for those requiring the higher angles.